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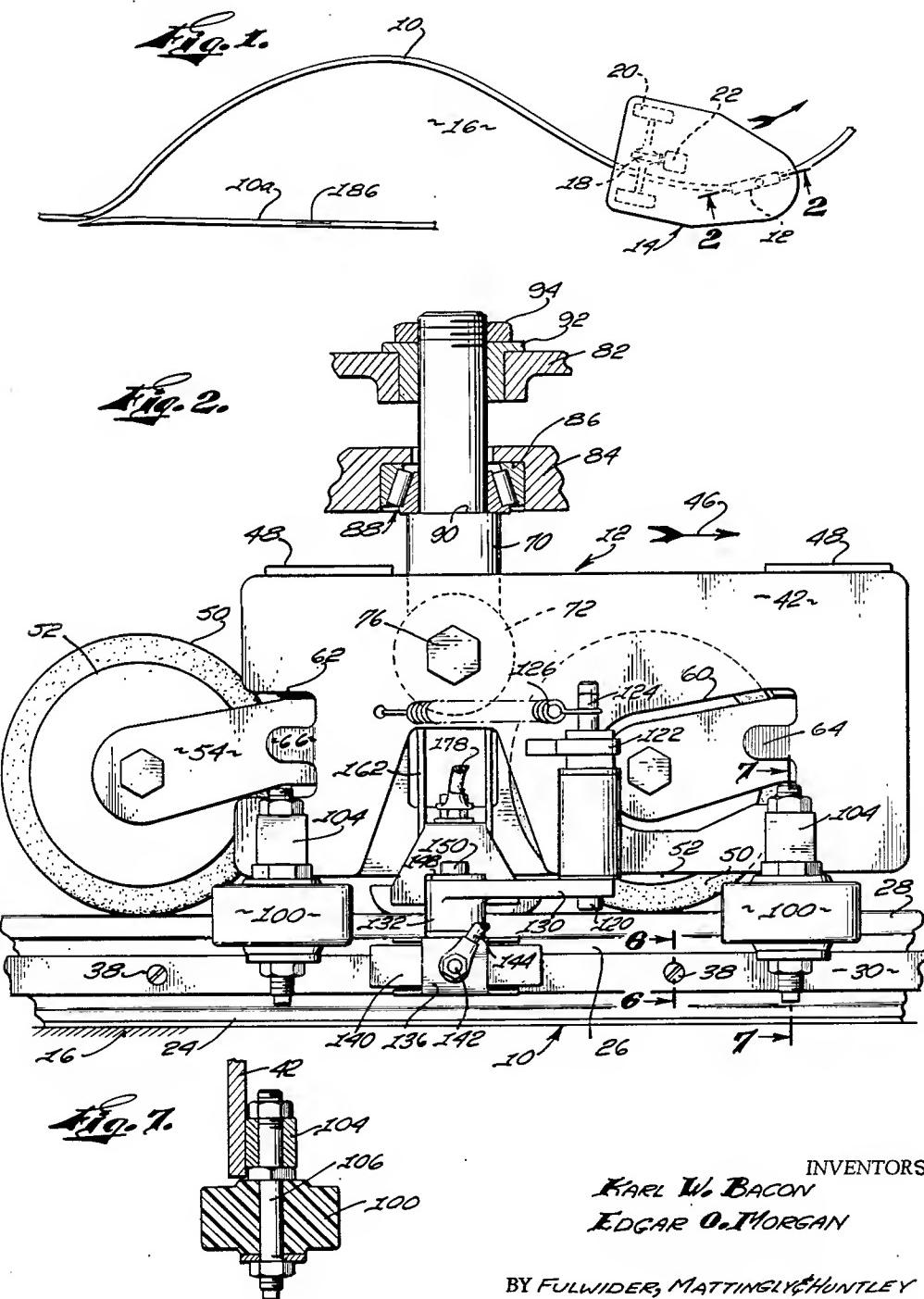
K. W. BACON ET AL

3,006,286

AMUSEMENT VEHICLE APPARATUS

Filed May 22, 1959

2 Sheets-Sheet 1



INVENTORS  
KARL W. BACON  
EDGAR O. MORGAN

BY FULWIDER, MATTINGLY & HUNTLEY

ATTORNEYS

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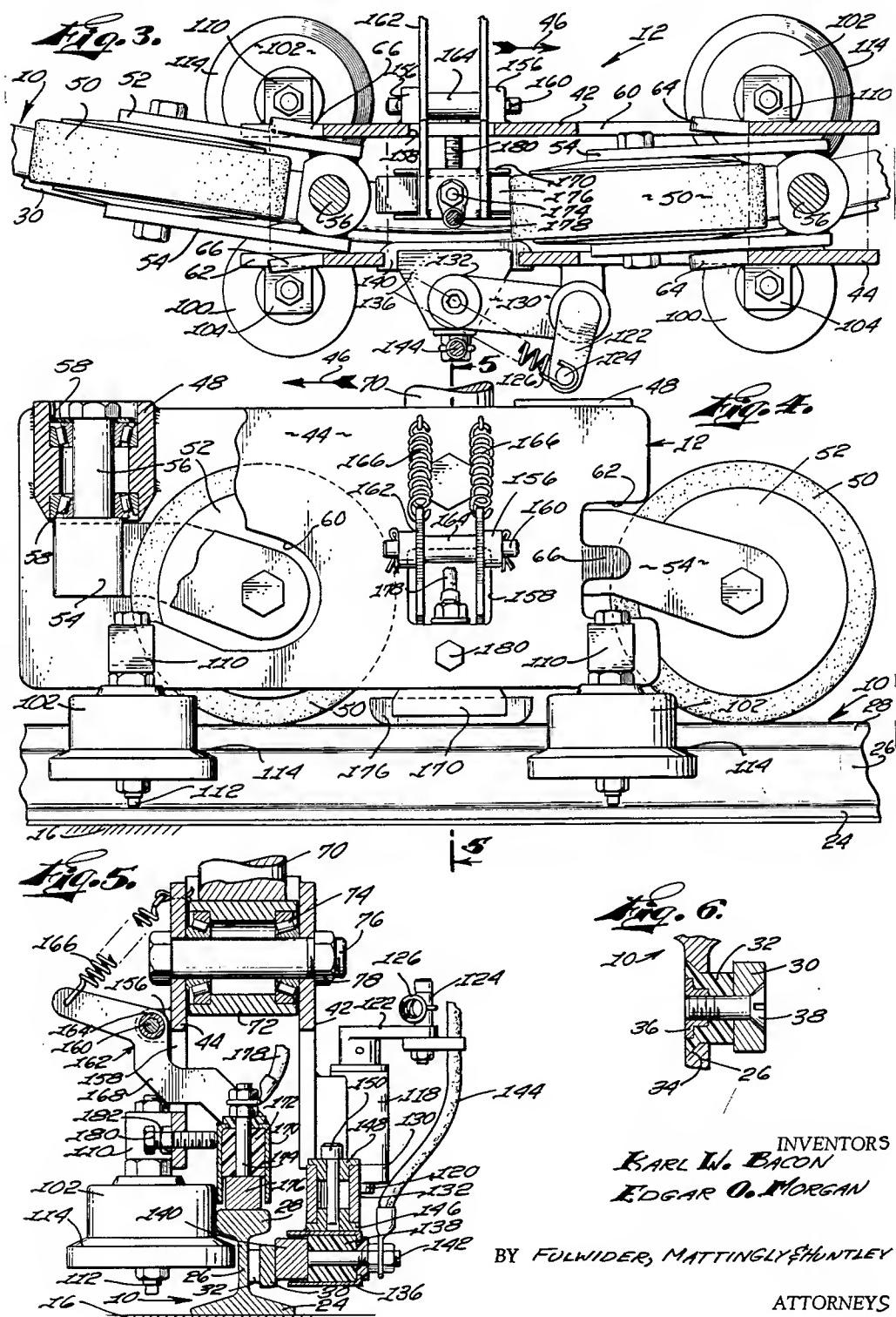
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## 1

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## AMUSEMENT VEHICLE APPARATUS

Karl W. Bacon, Mountain View, and Edgar O. Morgan, Palo Alto, Calif., assignors, by mesne assignments, to Walt Disney Productions, a corporation of California

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The present invention relates generally to an amusement vehicle apparatus, and more specifically to a self-propelled passenger-carrying vehicle having a steerable wheel guidedly engaged with a rail that defines a controlled path through an amusement area.

An object of my invention is to provide an improved electrical traction amusement vehicle apparatus.

Another object of the invention is to provide an amusement apparatus in which a continuous sinuous path runs through an amusement area, the path having an electrified guide rail for individually leading a plurality of self-propelled passenger vehicles of the electrical traction type.

A further object is the provision, in an apparatus of this type, of a tricycle type vehicle having a nosewheel assembly adapted for guidedly engaging a sinuous rail to steer the vehicle.

Yet another object of the invention is to provide a steerable nosewheel assembly for an electrical traction vehicle adapted to serve as an electrical pickup to interconnect a rear-axle motor drive to an electrified sinuous rail and in such a way as to ensure electrical contact with the rail despite abrupt changes of direction.

A still further object of the invention is to provide a steerable nosewheel assembly for a rail-guided amusement vehicle that is adapted to prevent disconnection of the assembly and rail, particularly when the rail is both vertically and horizontally sinuous.

Another object of the invention is to provide an amusement apparatus of this type in which a self-propelled vehicle is readily and quickly attachable or detachable from a guide rail.

Yet another object of the invention is to provide an amusement vehicle having a nosewheel assembly with freely castered wheels adapted to truly follow a sharply curved guide rail without wandering or oscillating so as to ensure a safe, vibrationless ride for the passenger.

These and other objects and advantages of the invention will be apparent from the following description of a presently preferred embodiment thereof when taken in conjunction with the annexed drawings in which:

FIGURE 1 is a plan view showing an amusement vehicle guidedly engaged with a portion of a sinuous rail that extends through an amusement area;

FIGURE 2 is a partial sectional view taken on the line 2—2 of FIGURE 1 and showing one side elevation of the nosewheel assembly of the amusement vehicle;

FIGURE 3 is a top plan view of the nosewheel assembly with portions cut away, to disclose interior details of construction;

FIGURE 4 is an elevational view of the other side of the nosewheel assembly;

FIGURE 5 is a vertical sectional view taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a fragmentary sectional view taken on the line 6—6 of FIGURE 2; and

FIGURE 7 is a fragmentary sectional view taken on the line 7—7 of FIGURE 2.

Referring now to the drawings for the general arrangement of the invention, and in particular to FIGURE 1, the amusement apparatus comprises a rail 10 guidedly engaged by a nosewheel assembly 12 of a passenger-carrying vehicle 14. The rail 10 is affixed in a conventional

## 2

manner to a floor surface 16 which defines a continuous path for the vehicle 14, this path winding sinuously through an amusement area that has both upgrades and downgrades. It will be understood that the amusement for the occupants of the vehicle 14 is derived not only from the abrupt changes in direction achieved by the rail configuration but also by automatically actuated figures or devices along the path. The rail 10 is continuous and centrally winds along the path of the vehicle and preferably has a spur 19a to a maintenance area onto which the vehicles 14 can be selectively switched.

The front end of the vehicle 14 is entirely supported by the nosewheel assembly 12 while the rear end of the vehicle is supported by a driving axle assembly 18 that includes floor-engaging wheels 20 straddling the rail 10. An electric motor 22 is mounted on the rear-axle assembly 18 to drive the wheels 20 and is energized for driving the vehicle 14 via the electrified rail 10 and the nosewheel assembly 12, which is provided with rail contact means connected to the motor through suitable conductors. A switch means (not shown) is provided whereby each vehicle 14 can be selectively controlled by an operator of the apparatus.

More specifically, the track or rail 10 is of conventional cross-sectional configuration, having a bottom flange 24, web 26 and a head 28. The rail 10 per se constitutes the ground line for the drive motor 22. For completing the circuit for the motor 22 a continuous bus bar 30 is fastened to one side of the web portion 26 of the rail 10 and extends throughout the length of the rail. As is shown in FIGURE 6, a plurality of insulators 32 are passed through suitable openings formed at spaced apart locations in the web 26, the head of each insulator 32 having a tapered seat 34 in the web adapted to support the enlarged head of the insulator flush with a side of the web. The head of the insulator 32 is in turn adapted to provide a flush seat for a T-nut 36 that in turn threadedly mates with a fastener 38 holding the bus bar 30 against the outwardly protruding end of the insulator.

The nosewheel assembly 12 includes a pair of similar, substantially rectangular side plates 42 and 44. The directional arrow 46 in FIGURES 2, 3 and 4 indicates the direction of travel of the assembly 12, and with reference to the arrow the plate 42 constitutes the left side of the assembly while the plate 44 constitutes the right side of the assembly. As is indicated in FIGURE 4, the two plates 42 and 44 are rigidly interconnected in parallel, spaced-apart and superposed relationship by a pair of tubular housings 48, welded or otherwise secured to the upper corner areas of the plates.

Rolling support for the assembly 12 is provided by a tandem pair of castered wheels 52, insulated from the rail 10 by nylon tires 50 and having an axial dimension approximately that of the width of the track head 28 and less than the spacing between the side plates 42 and 44. Each of the wheels 52 is mounted between the arms of a yoke frame 54, each frame at one end having a vertically extending swivel shaft 56 received in a suitable bearing 58 contained in one of the housings 48.

The front wheel 52 is wholly confined between the side plates 42 and 44, while the rear wheel 52 trails behind the side plates. To provide clearance for adequate movement of the arms of the yoke 54 in response to swivelling of the front wheel 52, the pair of plates 42 and 44 are relieved in their front end portions as indicated at 60 to pass the yoke arms. Similarly, another pair of relief openings 62 are formed in the rear vertical edges of the plates 42 and 44 to permit swinging movement of the arms of the rear yoke 54. To prevent over-travel of the wheels the front pair of relief openings 60 and the rear pair of relief openings 62 are provided with complementary pairs of ears 64 and 66, respectively. As can

be seen from FIGURE 3, the pairs of ears 64 and 66 comprise integral portions of the material of the side plates 42 and 44 which are bent outwardly so that each pair of ears includes an angle therebetween adapted to prevent swivelling movement of the wheels 52 beyond an arc which would allow the wheels to run off the most sharply curved portions of the rail 10.

The vehicle 14 and assembly 12 are interconnected by a vertically extending spindle 70. At its lower end this spindle is formed with a transversely extending tubular fulcrum 72 having an axial length slightly less than the spacing between the side plates 42 and 44. A bearing assembly 74, adapted for radial and thrust loads, is seated within the fulcrum 72 and its inner races support the stem of a bolt 76 that extends through the side plates, the bolt being provided with a nut 78 for securing it within the bearing assembly 74.

The upper end of the spindle 70 passes through a pair of vertically spaced apart floors 82 and 84 of the vehicle 14. The lower or sub-floor 84 is formed with counter-bore 86 adapted to seat the cup of a bearing 88, adapted for radial and thrust loads, the upper end portion of spindle 70 being formed with a shoulder 90 adapted to seat the cone of the bearing 88. The upper floor 82 of the vehicle mounts a bushing 92 journaling the extreme upper end of the spindle, and a retaining nut 94 is threadedly engaged with the upper end of the spindle 70, against the bushing 92, for maintaining the assembly 12 swivelly engaged with the vehicle 14.

To keep the castered wheels 52 from rolling off the top of the rail head 23 the assembly 12 along one side mounts a pair of guide rollers 100 and on the other side mounts another pair of safety rollers 102. As is shown in FIGURE 3, each roller 100 is mounted directly opposite one of the safety rollers 102 to provide a set of cooperating rollers at each end of the assembly 12 adapted to guide the vehicle 14 in accordance with the path of the rail 10 and also adapted to prevent relative vertical movement of the assembly 12 and the rail.

The right side plate 42 rigidly mounts a pair of bearings 104 along its lower edge and at opposite ends of the plate. Each of the bearings 104 journals a shaft 106 that extends vertically beneath the lower edge of the plate 42 and mounts one of the guide rollers 100 for rotation about a vertical axis and in rolling engagement with one side of the rail head 23.

The pair of safety rollers 102 are mounted in similar fashion on the left side plate 44. A pair of plain cylindrical bearings 110 are secured to the plate 44 along the lower edge thereof and at opposite ends of the plate. Each of the bearings 110 journals a shaft 112 that extends vertically beneath the lower edge of the plate 44 and at its lower end mounts one of the safety rollers 102. Each roller 102, in the portion of its length opposite the rail head 23, has a diameter adapted for rolling contact with one side of the head. To prevent lifting of the drive assembly from the rail 10, each roller 102, immediately beneath the level of the rail head 23, has an enlarged diameter portion defining an upwardly facing shoulder 114 of conical configuration that extends beneath the overhanging portion of the head 23.

To insulate the nosewheel assembly 12 from the track 10 the rollers 100 and 102 are made of an insulating material. In addition, the safety rollers 102 are preferably made of a hard material such as nylon so that the safety flange or shoulder 114 can firmly resist any vertically upward displacement tendency of the assembly 12 upon coming into contact with the overhanging rail head 23. The guide rollers 100, however, are preferably made of a deformable material such as rubber. The normal spacing between each guide roller 100 and its companion safety roller 102 is substantially equivalent to the width of the track head 23. Accordingly, when the vehicle 14 is traversing a straight run of the rail 10 all of the rollers 100 and 102 have firm rolling contact with

the head 23. When the vehicle 14 encounters a curved portion of the rail 10 a line intersecting the axes of each set of rollers 100 and 102 does not include the center of curvature of the rail; accordingly, the rollers 100 and 102 of each set tend to bind against the rail head 23, but this tendency is overcome by the deformation of the rubber guide rollers 100.

Particular attention is drawn to the relationship of the axes of rotation of each set of rollers 100 and 102 to the axis of the spindle 70, and also the pivot axis of the castered wheel 52 associated therewith. It will be apparent that the offsetting of the roller axes from the axis of the spindle 70 in a direction longitudinally of the nose-wheel assembly 12 provides ample leverage for causing the assembly and the vehicle 14 to turn promptly in response to changes in direction of the rail 10. This positioning of each set of rollers 100 and 102 is also adapted to overcome oscillating and eccentricities of the tandem pair of wheels 52 in both straight and curved portions of the rail 10 so as to provide a safe, smooth ride.

Referring now to FIGURE 3, it will be noted that the pivot axes of both wheels 52 are located on the longitudinal centerline of the assembly 12, along with the axis of the spindle 70 disposed between the wheels. A line 25 interconnecting the axes of each set of rollers 100 and 102 is spaced rearwardly of the pivot axis of the wheel 52 associated therewith. Accordingly, any turning tendency of the assembly 12, such as caused by vibration occurring along a straight run of the rail 10 or in following a curved portion of the rail 10, tends to displace the castered wheels 52 to opposite sides of the longitudinal centerline of the assembly 12. Thus, in FIGURE 3 the assembly 12 is undergoing a left turn and the front wheel 52 has been swung to the outside of the longitudinal axis 35 of the assembly 12 while the rear wheel 52 has been swung to the inside of the longitudinal axis of the assembly. The pair of wheels 52 thus assume directions other than tangentially disposed to the locus of the curve. Thus the rear safety roller 102 in FIGURE 3 is centrifugally urged outwardly and the front guide roller 100 is urged centrifugally inwardly, the two forces producing a turning couple on the spindle 70, tending to steer the assembly 12 in the direction of the rail 10. The force of this couple is sufficient to overcome or dampen any oscillatory vibration such as might be induced by loose 40 bearings.

For interconnecting the motor 22 to the bus bar 30 the nose wheel assembly 12 carries a pickup means such as is best seen in FIGURES 2 and 3. A vertically extending bearing is affixed to the right side plate 42 and journals a shaft 120 that extends both above and below the opposite ends of the bearing. A crank or arm 122 is affixed to the upper end of the shaft 120 to extend outwardly from the plate 44 and at its outer free end mounts 50 an upstanding pin 124. A tension spring 126 is interconnected between the pin 124 and a portion of the plate 42 and biases the shaft 120 for rotation in a clockwise direction as viewed in FIGURE 3.

At its lower end the shaft 120 rigidly mounts one end 60 of a hot-shoe arm 130 that at its outer end is provided with a vertically extending tubular bracket 132. A hot-shoe assembly is mounted in the bracket 132 and is positioned for yielding contact with the bus bar 30 in response to the action of the spring 126. This hot-shoe assembly 65 includes a U-shaped shell 136 enclosing a block of insulating material 138. A contact brush 140 is mounted on the insulating block 138 for wiping contact with the bus bar 30 and is held in place by a terminal or stud 142 which extends through the block 138 to extend outwardly 70 from the shell 136. A conductor 144 is connected at one end to the exposed end of the stud 142 and at its outer end is connected to the motor 22. On its upper face the shell 136 rigidly mounts a T-nut 146 whose stem is adapted for reception within the lower end of the tubular bracket 132. A bolt 150 is adapted to threadedly en-

gage the T-nut 146 and has its head seated on fitting 148 mounted in the upper end of the bracket 132.

To connect the motor 22 to ground the nosewheel assembly 12 also includes a ground shoe assembly, best seen in FIGURE 4. A pair of bosses 156 are affixed to the left side plate 44 along opposite sides of a substantially rectangular aperture 158 formed in the plate. These bosses are formed with aligned bores which rotatably support a pivot shaft 160 held against axial displacement by suitable cotters and serving as the pivot axis of a pair of generally bell crank-shaped levers 162 that are held against the inner faces of the bosses 156 by a tubular spacer 164 coaxial with the shaft 160. A tension spring 166 is connected at one end to the outwardly and upwardly protruding end of each lever 162 and at its other end is fastened to the plate 44.

An irregularly shaped portion of each lever 162 extends inwardly through the aperture 158 and thence downwardly to support a ground-shoe assembly at its lower end. This assembly is substantially similar to the hot-shoe assembly previously described and comprises a protective shell 170 enclosing an insulating block 172 that in turn contains a stud 174 on whose lower end a brush 176 is mounted. The upper end of the stud 174 protrudes outwardly from the shell 170 and is connected to a conductor 178 that leads to the motor 22. As is apparent, the brush 176 is yieldably biased into contact with the upper surface of the track head 28 by the action of the pair of springs 166. To limit movement of the ground-shoe assembly in a direction transversely of the rail 10 a stop bolt 180 is threadedly inserted through the side wall 44 to engage the protective shell 170 at its inner end and is held in adjusted position by a lock nut 182.

In order to service a vehicle 14 it is run onto a spur 10a until the nosewheel assembly 12 is positioned at a slot 186, formed along one side of the web of the rail by relieving a portion of the rail head 28. This slot has a length sufficient to pass the pair of guide rollers 102 upwardly therethrough upon lifting of the vehicle. Once the vehicle 14 has been removed maintenance can be performed thereon.

It will be understood that various modifications and changes may be made with respect to the foregoing description without departing from the spirit of the invention or the scope of the following claims.

We claim:

1. In a vehicle apparatus of the type in which a vehicle is guidedly conducted along a path the combination comprising: a rail mounted on and extending along said path; a vehicle having a path-supported pair of rear wheels straddling said rail; a nosewheel assembly pivotally mounted in the front end of said vehicle and including tandem individually castered wheels to rollingly support the front end of said vehicle on top of a head of said rail, said assembly including a means for each of said castered wheels to limit the range within which said castered wheels can be displaced relative to the longitudinal centerline of said rail, the top of said rail having a surface to permit swivelling of said castered wheels to opposite sides of the longitudinal centerline of said rail; and a pair of rollers mounted on said assembly for contact with the opposite sides of said rail on axes of rotation offset longitudinally of said assembly from the pivotal axis of said assembly to dirigibly control said assembly for changes in direction corresponding to changes in direction of said rail.

2. An apparatus as set forth in claim 1 in which the pivotal axis of said assembly is intermediate the pivot axes of said tandem wheels and two pairs of said rollers are mounted on said assembly, one pair of said rollers being mounted on the front end of said assembly with their axes of rotation intermediate the pivotal axis of said assembly and the pivot axis of the front one of said tandem wheels, and the other pair of said rollers being

mounted on the rear end of said assembly with their axes of rotation rearwardly spaced from the pivot axis of the rear one of said tandem wheels.

3. An apparatus as set forth in claim 2 in which said rollers of each pair have contact with opposite sides of the head of said rail, one roller of each pair having an enlarged portion overhung by said head to prevent upward displacement of said assembly from said rail.

4. In a vehicle apparatus of the type in which a vehicle is guidedly conducted along a path the combination comprising: a rail mounted on and extending along said path; a vehicle having a path-supported pair of rear wheels straddling said rail; a nosewheel assembly pivotally mounted on the front end of said vehicle and including a castered wheel means to rollingly support the front end of said vehicle on top of the head of said rail, said castered wheel means being swingable laterally of the head on said rail; and two pairs of opposed rollers each of which is mounted on one end of said assembly with the rollers of each pair being adapted for rolling contact with the opposite sides of said rail on vertical axes of rotation offset longitudinally of said assembly from the pivotal axis of said assembly to dirigibly control said assembly for changes in direction corresponding to changes in direction of said rail, at least one roller of each pair being resiliently deformable.

5. An apparatus as set forth in claim 4 in which the other roller of each of said pairs is formed of a rigid material and has an enlarged portion overhung by said head of said rail to prevent upward displacement of said assembly from said rail.

6. An apparatus as set forth in claim 4 in which said castor-wheel means comprises a tandem pair of castered wheels mounted at opposite ends of said assembly, each of said wheels having a vertically disposed swivel axis spaced forwardly of the pair of rollers adjacent thereto, said assembly having a pair of stop means each of which is operatively associated with one of said pair of wheels to limit swivelling movement of said wheels on said rail to a predetermined arc.

7. In a vehicle apparatus of the type in which a vehicle is guidedly conducted along a path, the combination comprising: a rail mounted on and extending along said path; a vehicle having a path-supported pair of rear wheels straddling said rail; a nosewheel frame pivotally supporting the front end of said vehicle; a nosewheel castered in said frame for swivelling movement relative to said frame to support the front end of said vehicle on said rail, said rail having an upper surface to permit swivelling of said nosewheel to opposite sides of the longitudinal center line of said rail; and means on said frame in contact with opposite sides of said rail to guide said frame and vehicle along said rail.

8. An apparatus as defined in claim 7 having a means on said frame to limit the range within which said castered wheel can be displaced relative to the longitudinal center line of said rail.

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